

CLAIMS

[C001] 1. An apparatus comprising:

a film; and

a fixture comprising at least one inner member and at least one outer member,

wherein said at least one inner member and said at least one outer member are configured to secure said film therebetween.

[C002] 2. The apparatus of Claim 1, wherein said film comprises a material selected from the group consisting of thermoplastic polymers and thermoset polymers.

[C003] 3. The apparatus of Claim 2, wherein said thermoplastic polymers are selected from the group consisting of polycarbonates, polyesters, polyestercarbonates, polyamides, polyimides, polyolefins, polyphenylene ethers, polyamideimides, polyethersulfones, polyacrylates, styrenic polymers, silicones, epoxy resins, silicone-functionalized epoxy-resins, copolymers, derivatives, and blends thereof.

[C004] 4. The apparatus of Claim 2, wherein said thermoplastic polymer is selected from the group consisting of polybutylene terephthalate; polyethylene terephthalate; styrene-acrylonitrile copolymer; styrene-methacrylonitrile copolymer; acrylonitrile-butadiene-styrene copolymer; acrylonitrile-alpha-methylstyrene-butadiene copolymer; polyarylate copolymers comprising repeating derived from isophthalic acid, terephthalic acid, resorcinol, and bisphenol A; polycarbonates comprising repeating units derived from at least one of bisphenol A, 1,3-bis(4-hydroxyphenyl)-1-methyl-4-isopropylcyclohexane, and 2,8-bis(4-hydroxyphenyl)-1-methyl-4-isopropylcyclohexane; and blends of the foregoing polymers.

[C005] 5. The apparatus of Claim 1, wherein said film and said at least one inner member and said at least one outer member comprise the same material.

[C006] 6. The apparatus of Claim 1, wherein said polymer film and said at least one inner member and said at least one outer member have substantially the same thermal properties.

[C007] 7. The apparatus of Claim 1, wherein at least one of said at least one inner member and said at least one outer member comprises one of at least one mask portion and at least one aperture portion.

[C008] 8. The apparatus of Claim 1, wherein said apparatus further comprises an interface member, wherein said interface member is disposed between said at least one inner member and said at least one outer member.

[C009] 9. The apparatus of Claim 1, wherein one of said at least one inner member and said at least one outer member is edge-contoured.

[C010] 10. The apparatus of Claim 1, wherein the inner side of said at least one outer member and the outer side of said at least one inner member contacting said film have rounded corners.

[C011] 11. A fixture for securing a film, said fixture comprising:

at least one inner member; and

at least one outer member,

wherein said at least one inner member is configured to fit in said at least one outer member such that said at least one inner member and said at least one outer member together are capable of securing said film therebetween.

[C012] 12. The fixture of Claim 11, wherein said at least one inner member and said at least one outer member comprise a material independently selected from the group consisting of polymers, metals, glass, ceramics, and fiber-reinforced materials.

[C013] 13. The fixture of Claim 11, wherein said polymers are selected from the group consisting of thermoset polymers and thermoplastic polymers.

[C014] 14. The fixture of Claim 11, wherein said metals are selected from the group consisting of iron, aluminum, nickel, copper, stainless steel, monel, and inconel.

[C015] 15. The fixture of Claim 11, wherein said at least one inner member and said at least one outer member comprise a liner, said liner being configured to grip said film between said at least one inner member and said at least one outer member; and said liner is disposed in a position selected from the group consisting of inner side of said at least one outer member and outer side of said at least one inner member.

[C016] 16. The fixture of Claim 15, wherein said liner has a design selected from the group consisting of a right circular cylinder, a concave, a convex, a tongue-in-groove, and a press-fit design.

[C017] 17. A method for securing a plastic film, said method comprising:

disposing said film between at least one inner member and at least one outer member of a fixture; and

moving at least one of said at least one inner member and said at least one outer member toward the other member to secure said film therebetween.

[C018] 18. The method of Claim 17, wherein said at least one inner member and said at least one outer member are maintained at a temperature selected from the group consisting of sub-ambient temperature, ambient temperature, and above-ambient temperature.

[C019] 19. The method of Claim 17, wherein said film comprises material selected from the group consisting of thermoplastic polymers, and thermoset polymers.

[C020] 20. The method of Claim 19, wherein said thermoplastic polymers are selected from the group consisting of polycarbonates, polyesters, polyesterarbonates, polyamides, polyimides, polyolefins, polyphenylene ethers, polyamideimides, polyethersulfones, polyacrylates, styrenic polymers, silicones, epoxy resins, silicone-functionalized epoxy-resins, copolymers, derivatives, and blends thereof.

[C021] 21. The apparatus of Claim 19, wherein said thermoplastic polymer is selected from the group consisting of polybutylene terephthalate; polyethylene terephthalate; styrene-acrylonitrile copolymer; styrene-methacrylonitrile copolymer; acrylonitrile-butadiene-styrene copolymer; acrylonitrile-alpha-methylstyrene-butadiene copolymer; polyarylate copolymers comprising repeating derived from isophthalic acid, terephthalic acid, resorcinol, and bisphenol A; polycarbonates comprising repeating units derived from at least one of bisphenol A, 1,3-bis(4-hydroxyphenyl)-1-methyl-4-isopropylcyclohexane, and 2,8-bis(4-hydroxyphenyl)-1-methyl-4-isopropylcyclohexane; and blends of the foregoing polymers.

[C022] 22. A method for producing a processed film, said method comprising:

disposing a film between at least one inner member and at least one outer member of a fixture;

moving at least one of said at least one inner member and said at least one outer member toward the other member to secure said film therebetween to produce a secured film;

exposing said secured film to at least one processing step to produce a processed film; and

moving apart said at least one inner member and said at least one outer member to release said processed film from said fixture.

[C023] 23. The method of Claim 22, wherein said processing step is selected from the group consisting of coating, thermal treatment, radiation treatment, patterning, and depositing.

[C024] 24. The method of Claim 23, wherein said coating is selected from the group consisting of chemical vapor deposition, physical vapor deposition, powder coating, spin coating, and spray coating.

[C025] 25. The method of Claim 22, wherein said radiation treatment comprises irradiating said secured film with a radiation selected from the group consisting of electron beam, ion beam, ultraviolet light, visible light and infrared light radiation.

[C026] 26. A method for producing a processed article comprising a processed film, said method comprising:

disposing said processed film between at least one inner member and at least one outer member of a fixture;

moving at least one of said at least one inner member and said at least one outer member toward the other member to secure said film therebetween to produce a secured processed film;

disposing an article on said secured processed film to produce a processed article; and

moving apart said at least one inner member and said at least one outer member to release said processed article.

[C027] 27. The method of Claim 26, wherein said processed film, said at least one inner member, and said at least one outer member have substantially the same thermal properties.

[C028] 28. A manufacturing system for producing a processed film, said system comprising:

a film dispensing station;

a film fixturing station,

a film processing station, and

a film de-fixturing station,

wherein said film-fixturing station comprises at least one fixture comprising at least one inner member and at least one outer member, and said at least

one inner member and said at least outer member are configured to securely hold a film therebetween.

[C029] 29. The manufacturing system of Claim 28, wherein said film dispensing station comprises at least one device selected from the group consisting of film cutting device, film interleaving device, film corner rounding device, film slitting device, die cutting device, hole drilling device, and padding device.

[C030] 30. The manufacturing system of Claim 28, wherein said fixturing station is capable of batch wise and continuous securing of said film in said at least one fixture.